

SVENSK STANDARD

SS-EN 14127:2011



Fastställt/Approved: 2011-02-15
Publicerad/Published: 2011-03-16
Utgåva/Edition: 2
Språk/Language: engelska/English
ICS: 19.100

Oförstörande provning – Tjockleksmätning med ultraljud

Non-destructive testing – Ultrasonic thickness measurement



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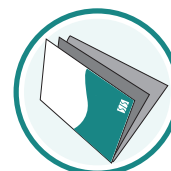
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This standard supersedes the Swedish Standard SS-EN 14127:2004, edition 1.

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EUROPEAN STANDARD

EN 14127

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2011

ICS 19.100

Supersedes EN 14127:2004

English Version

Non-destructive testing - Ultrasonic thickness measurement

Essais non destructifs - Mesurage de l'épaisseur par ultrasons

Zerstörungsfreie Prüfung - Dickenmessung mit Ultraschall

This European Standard was approved by CEN on 25 December 2010.

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Contents

	Page
Foreword.....	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Measurement modes	5
5 General requirements.....	7
5.1 Instruments	7
5.2 Probes.....	7
5.3 Couplant	7
5.4 Reference blocks	7
5.5 Test objects	7
5.6 Qualification of personnel	8
6 Application of the technique	8
6.1 Surface conditions and surface preparation	8
6.2 Technique	8
6.2.1 General.....	8
6.2.2 Measurement during manufacture.....	9
6.2.3 In-service measurement of residual wall thickness.....	9
6.3 Selection of probe.....	9
6.4 Selection of instrument.....	10
6.5 Materials different from the reference	10
6.6 Special measuring conditions.....	10
6.6.1 General.....	10
6.6.2 Measurements at temperatures below 0 °C	11
6.6.3 Measurements at elevated temperatures	11
6.6.4 Hazardous atmospheres	11
7 Instrument setting.....	11
7.1 General.....	11
7.2 Methods	12
7.2.1 General.....	12
7.2.2 Digital thickness instruments.....	12
7.2.3 A-scan Instruments	12
7.3 Check of settings	13
8 Influence on accuracy	14
8.1 Operational conditions.....	14
8.1.1 Surface conditions.....	14
8.1.2 Surface temperature.....	14
8.1.3 Metallic coating	15
8.1.4 Non-metallic coating	15
8.1.5 Geometry	16
8.2 Equipment	17
8.2.1 Resolution	17
8.2.2 Range	17
8.3 Evaluation of accuracy.....	18
8.3.1 General.....	18
8.3.2 Influencing parameters	18
8.3.3 Method of calculation	18

9	Influence of materials	18
9.1	General	18
9.2	Inhomogeneity	18
9.3	Anisotropy	18
9.4	Attenuation	18
9.5	Surface conditions	18
9.5.1	General	18
9.5.2	Contact surface	19
9.5.3	Reflecting surface	19
9.5.4	Corrosion and erosion	20
10	Test report	20
10.1	General	20
10.2	General information	20
10.3	Inspection data	21
Annex A	(informative) Corrosion in vessels and piping	22
A.1	General	22
A.2	Measurement of general corrosion	22
A.2.1	Instrument	22
A.2.2	Probes	22
A.2.3	Setting of the instrument	22
A.2.4	Measuring	23
A.3	Measurement of corrosion with pitting	23
A.3.1	Instrument	23
A.3.2	Probes	23
A.3.3	Setting of the instrument	23
A.3.4	Measuring	23
Annex B	(informative) Instrument settings	29
Annex C	(informative) Parameters influencing accuracy	31
C.1	Parameters influencing accuracy	31
C.2	Methods of calculation	33
Annex D	(informative) Measuring technique selection	36
Bibliography	40

Foreword

This document (EN 14127:2011) has been prepared by Technical Committee CEN/TC 138 “Non-destructive testing”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2011, and conflicting national standards shall be withdrawn at the latest by August 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14127:2004, which has been editorially revised, in order to take into account the new edition of EN 1330-4:2010.

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1 Scope

This European Standard specifies the principles for ultrasonic thickness measurement of metallic and non-metallic materials by direct contact, based on measurement of time-of-flight of ultrasonic pulses only.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 583-2, *Non-destructive testing — Ultrasonic examination — Part 2: Sensitivity and range setting*

EN 1330-4:2010, *Non-destructive testing — Terminology — Part 4: Terms used in ultrasonic testing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1330-4:2010 apply.

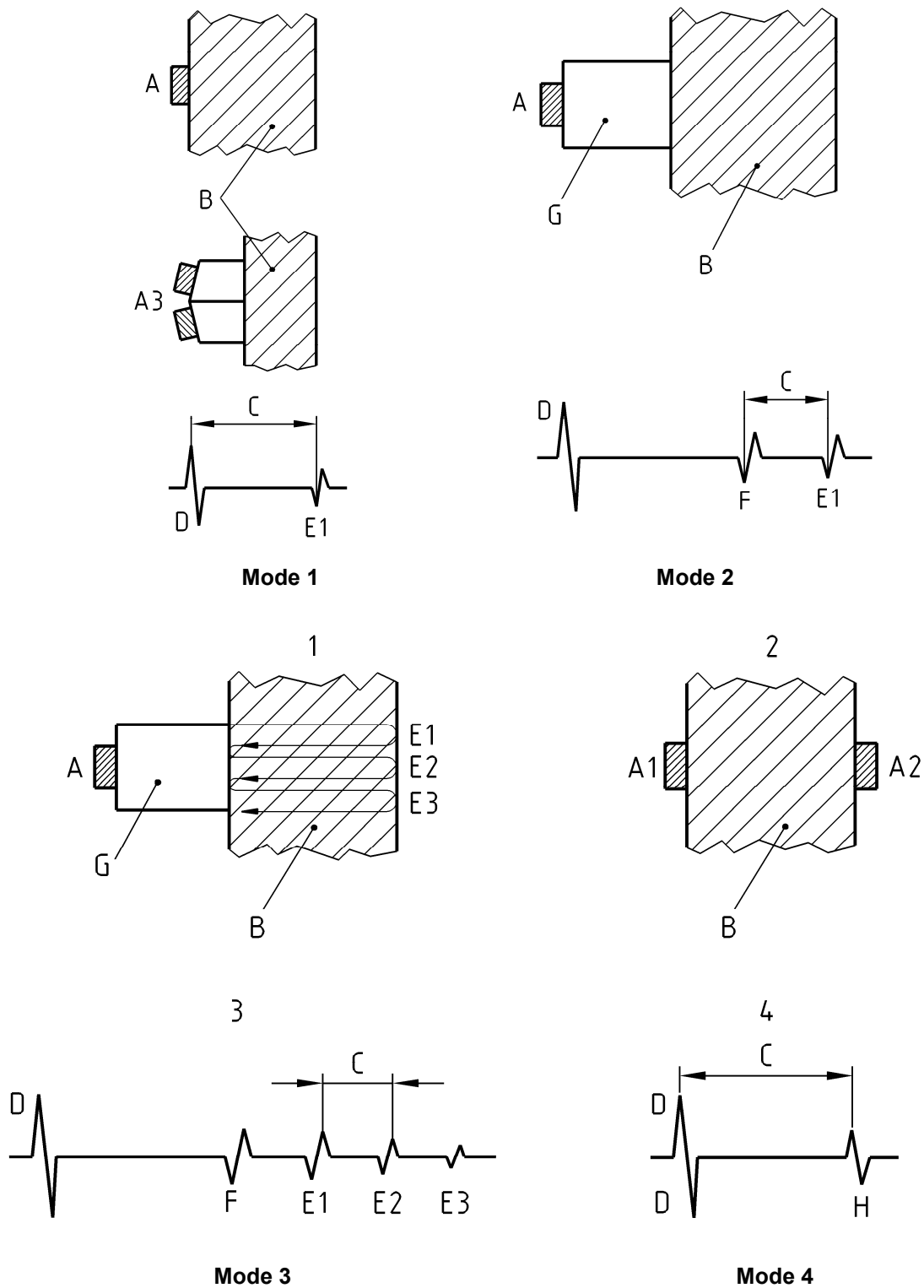
4 Measurement modes

The thickness of a part or structure is determined by accurately measuring the time required for a short ultrasonic pulse generated by a transducer to travel through the thickness of the material once, twice or several times.

The material thickness is calculated by multiplying the known sound velocity of the material with the transit time and dividing by the number of times the pulse transits the material wall.

This principle can be accomplished by applying one of the following modes, see Figure 1:

- a) Mode 1: Measure the transit time from an initial excitation pulse to a first returning echo, minus a zero correction to account for the thickness of the transducer wear surface and the couplant layer (single echo mode).
- b) Mode 2: Measure the transit time from the end of a delay line to the first backwall echo (single echo delay line mode).
- c) Mode 3: Measure the transit time between back-wall echoes (multiple echoes).
- d) Mode 4: Measure the transit time for a pulse travelling from the transmitter to a receiver in contact with the back-wall (through transmission mode).



Key

- | | | | |
|----|------------------------|----------|-------------------------------|
| A | transmit/receive probe | D | transmission pulse indication |
| A1 | transmit probe | E1 to E3 | back-wall echoes |
| A2 | receive probe | F | interface echo |
| A3 | dual element probe | G | delay path |
| B | test object | H | received pulse |
| C | sound path travel time | | |

Figure 1 — Measurement modes

5 General requirements

5.1 Instruments

Thickness measurement can be achieved by using the following types of instruments:

- a) dedicated ultrasonic thickness measurement instruments with numerical display showing the measured value;
- b) dedicated ultrasonic thickness measurement instruments with numerical display showing the measured value and A-scan presentation (waveform display);
- c) instruments designed primarily for detection of discontinuities with A-scan presentation of signals. This type of instrument may also include numerical display of thickness values.

See 6.4.

5.2 Probes

The following types of probes are used, these are generally longitudinal wave probes:

- dual element probes;
- single transducer probes.

See 6.3.

5.3 Couplant

Acoustic contact between probe (probes) and material has to be provided, normally by application of a fluid or gel.

The couplant shall not have any adverse effect on the test object, the equipment or represent a health hazard to the operator.

For couplant to be used in special measuring conditions see 6.6.

The coupling medium should be chosen to suit the surface conditions and the irregularities of the surface to ensure adequate coupling.

5.4 Reference blocks

The measuring system shall be calibrated on one or more samples or reference blocks representative of the object to be measured, i.e. having comparable dimensions, material and structure. The thickness of the blocks or the steps should cover the range of thickness to be measured. Either the thickness or the sound velocity of the reference blocks shall be known.

5.5 Test objects

The object to be measured shall allow for ultrasonic wave propagation.

There shall be free access to each individual area to be measured.

The surface of the area to be measured shall be free of all dirt, grease, lint, scale, welding flux and spatter, oil or other extraneous matter that could interfere with the examination.

If the surface is coated, the coating shall have good adhesion to the material. Otherwise it shall be removed.

When measuring through coating its thickness and sound velocity need to be known unless mode 3 is used.